What Is Claimed Is:

1	1.	A method that facilitates establishing a quorum for a cluster within
2	a plurality of	computers that are geographically distributed, the method
3	comprising:	
4	detect	ing a change in membership of the cluster at a computer within the
5	plurality of co	omputers; and
6	upon o	detecting the change in membership,
7		forming a potential new cluster by attempting to
8		communicate with all other computers within the plurality of
9		computers,
10		accumulating votes for each computer successfully
11		contacted,
12		attempting to gain control of a quorum server located at a
13		site separate from all computers within the plurality of computers,
14		if successful, accumulating the quorum server's votes, and
15		if a total of accumulated votes includes a majority of
16		available votes, forming a new cluster from the potential new
17		cluster.
1	2.	The method of claim 1, wherein detecting the change in
2	membership i	involves:
3	excha	nging heartbeat messages with all computers that are part of the
4	cluster; and	
5	upon discovering an absence of heartbeat messages from any computer in	
6	the cluster, initiating a cluster membership protocol.	

1	3.	The method of claim 1, wherein detecting the change in cluster
2	membership	includes detecting that the cluster has not been formed.
1	4.	The method of claim 1, wherein attempting to gain control of the
2	quorum serv	er involves communicating with the quorum server using
3	cryptographi	c techniques.
1	5.	The method of claim 1, further comprising:
2	exch	anging a status message with each member of the new cluster; and
3	upda	ting a local status at the computer to a most recent status available
4	within the sta	atus message.
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1	6.	A method that facilitates establishing a quorum for a cluster within
2	a plurality of	computers that are geographically distributed, the method
3	comprising:	
4	provi	ding a quorum server at a site separate from a location of a computer
5	within the pl	urality of computers;
6	assign	ning at least one vote to each computer within the plurality of
7	computers;	
8	assign	ning at least one vote to the quorum server;
9	attem	pting to establish communications between each pair of computers
10	within the plu	urality of computers;
11	accun	nulating a count of votes for each computer communicated with at
12	each compute	er;
13	attem	pting to establish control over the quorum server from each computer
14	within the plu	rality of computers;

15	if control is established over the quorum server, accumulating the quorum		
16	server's votes in the count of votes; and		
17	establishing the quorum when a majority of available votes has been		
18	accumulated in the count of votes.		
1	7. The method of claim 6, wherein the quorum server grants control		
2	to only a first computer attempting to establish control.		
1	8. The method of claim 6, wherein the quorum server grants control		
2	to only one computer of all computers attempting to establish control based on a		
3	pre-established priority list.		
1	9. The method of claim 6, wherein votes are assigned so that the		
2	quorum includes at least one computer that was in an immediately previous		
3	cluster, to ensure that a cluster formed from the quorum has current data.		
1	10. The method of claim 6, wherein attempting to establish control		
2			
3	over the quorum server involves establishing communications with the quorum		
3	server.		
1	11. The method of claim 10, wherein establishing communications		
2	with the quorum server involves using cryptographic techniques.		
1	12. A computer-readable storage medium storing instructions that		
2	when executed by a computer cause the computer to perform a method that		
3	facilitates establishing a quorum for a cluster within a plurality of computers that		
4	are geographically distributed, the method comprising:		

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1	detecting a change in membership of the cluster at a computer within the	
2	plurality of computers; and	
3	upon detecting the change in membership,	
4	forming a potential new cluster by attempting to	
5	communicate with all other computers within the plurality of	
6	computers,	
7	accumulating votes for each computer successfully	
8	contacted,	
9	attempting to gain control of a quorum server located at a	
10	site separate from all computers within the plurality of computers,	
11	if successful, accumulating the quorum server's votes, and	
12	if a total of accumulated votes includes a majority of	
13	available votes, forming a new cluster from the potential new	
14	cluster.	
1	13. The computer-readable storage medium of claim 12, wherein	
2	detecting the change in membership involves:	
3	exchanging heartbeat messages with all computers that are part of the	
4	cluster; and	
5	upon discovering an absence of heartbeat messages from any computer i	
6	the cluster, initiating a cluster membership protocol.	

14. The computer-readable storage medium of claim 12, wherein detecting the change in cluster membership includes detecting that the cluster has not been formed.

1	15.	The computer-readable storage medium of claim 12, wherein	
2	attempting to gain control of the quorum server involves communicating with the		
3	quorum server using cryptographic techniques.		
1	16.	The computer-readable storage medium of claim 12, the method	
2	further compri	sing:	
3	exchan	iging a status message with each member of the new cluster; and	
4	updating a local status at the computer to a most recent status available		
5	within the status message.		
1	17.	A computer-readable storage medium storing instructions that	
2	when executed	d by a computer cause the computer to perform a method that	
3	facilitates esta	blishing a quorum for a cluster within a plurality of computers that	
4	are geographic	cally distributed, the method comprising:	
5	provid	ing a quorum server at a site separate from a location of a computer	
6	within the plurality of computers;		
7	assign	ing at least one vote to each computer within the plurality of	
8	computers;		
9	assign	ing at least one vote to the quorum server;	
10	attemp	oting to establish communications between each pair of computers	
11	within the plu	rality of computers;	
12	accum	ulating a count of votes for each computer communicated with at	
13	each compute	r;	
14	attemp	oting to establish control over the quorum server from each computer	
15	within the plu	rality of computers;	
16	if cont	trol is established over the quorum server, accumulating the quorum	
17	server's votes	in the count of votes; and	

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18	establi	shing the quorum when a majority of available votes has been
19	accumulated i	n the count of votes.
1	18.	The computer-readable storage medium of claim 17, wherein the
2	quorum serve	r grants control to only a first computer attempting to establish
3	control.	
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1	19.	The computer-readable storage medium of claim 17, wherein the
2	_	r grants control to only one computer of all computers attempting to
3	establish cont	rol based on a pre-established priority list.
1	20.	The computer-readable storage medium of claim 17, wherein votes
2	are assigned s	so that the quorum includes at least one computer that was in an
3	immediately j	previous cluster, to ensure that a cluster formed from the quorum has
4	current data.	
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1	21.	The computer-readable storage medium of claim 17, wherein
2		establish control over the quorum server involves establishing
3	communicati	ons with the quorum server.
1	22.	The computer-readable storage medium of claim 21, wherein
2	establishing of	communications with the quorum server involves using cryptographic
3	techniques.	
1	23	A system that facilitates establishing a quorum for a cluster within

a plurality of computers that are geographically distributed, comprising:

the plurality of computers;

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computers.

4	a network coupling the plurality of computers;	
5	a quorum server located at a site separate from any one computer of the	
6	plurality of computers; and	
7	an independent communications link coupling each computer of the	
8	plurality of computers and the quorum server.	
1	24. The system of claim 23, wherein the quorum server includes a	
2	mechanism for granting control to only one computer of the plurality of computers	
3	requesting control.	
1	25. The system of claim 23, wherein the quorum server includes a	
2	mechanism for maintaining a list of computers accepted into the cluster.	
1	26. The system of claim 23, wherein the quorum server includes a	
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2	mechanism for cryptographically ensuring an identity of a computer attempting to	
3	establish control.	
1	27. The system of claim 23, wherein the quorum server includes	
2	monitoring means to monitor the status of each computer within the plurality of	